BEDSIDE MEDICINE FOR BEDSIDE DOCTORS

An open forum for brief discussions of the workaday problems of the bedside doctor. Suggestions for subjects for discussion invited.

ADEQUATE ARTERIAL TENSION

J. Marion Read, San Francisco—As justification for raising a controversial subject at this usually quiet bedside, I quote a sentence from Sir James Mackenzie published fifteen years ago: "There has been so much nonsense talked and written about high blood pressure that I am constrained to draw attention to our extreme ignorance of the cause and consequence of raised blood pressure."

While we may know more regarding its consequences than we did in 1913, our ignorance of its cause, or causes, persists practically unchanged. In lieu of information on these points it might be profitable to bedside doctors to review some fundamentals of the physiology of arterial tension which may assist somewhat in understanding the pathological physiology of hypertension.

It is astounding to observe the great interest manifest in a simple, long-recognized physiologic function after the advent of an instrument of precision, such as the sphygmomanometer, enables us to measure and record this function quantitatively. It is just three hundred years since Harvey, in 1628, informed the world that the blood moved through the circulatory system by virtue of pressure exerted upon it during the heart's contraction. Closer to our own time, Richard Bright expressed his belief that the cardiac hypertrophy he had observed in renal disease was due to the associated arterial hypertension. But no great interest in arterial tension was manifest until we began, about twenty years ago, to express it in figures. This interest was so great that it overflowed the profession, and the laity awakened to the fact that there was such a thing as "blood pressure," which could be talked about in figures just like one's weight, age, children, stocks or bonds. And moreover there was a formula by which it was easy to calculate exactly what any individual's pressure should be—just add 100 to the individual's age! Simple—very simple!

When the term "blood pressure" is used, most of us, and all the laity, think at once of systolic pressure. This is largely because the systolic was the only pressure read for the first eight years of clinical sphygmomanometry. After the introduction of the auscultatory method, about 1914, which enabled us to read the diastolic pressure and calculate the differential pressure, our views should have been revised.

The chronological order in which the three pressures became known to us is the reverse order of their physiological importance. We had the roof (systolic) before the foundation (diastolic), and after all it is the space between (pulse pressure) for which these other two exist.

In general the diastolic pressure measures the relatively stable and constant peripheral resistance which forces shut the aortic valve and must be overcome by the left ventricle in reopening that valve. The force which the heart continues to exert after opening the valve is felt as the pulse and it is this part only of the total systolic force which is effective in moving the blood stream. Feeling the pulse as a guide to the ventricular power yields only part of the answer unless one also knows the diastolic pressure. The pulse pressure is normally about one-half as great as the diastolic pressure; thus two-thirds of the ventricular contraction power is expended in overcoming peripheral resistance and the elastic force of the great vessels, while only one-third is useful in propelling the blood column. The elastic recoil of the large vessels assists, however, in moving the blood during diastole. The intravascular pressure falls somewhat during diastole so that the force necessary to reopen the aortic valve is less than that which causes closure of the valve.

It hardly seems necessary to note that we do not measure the pulse pressure directly but calculate it as the difference between diastolic and systolic pressures. For this reason many writers prefer the designation "differential pressure," referring to its mathematical derivation, rather than the term "pulse pressure," which signifies its physiologic importance.

When, from any cause, the peripheral resistance is increased the myocardium must increase its force of contraction if it is to maintain an adequate circulation. A competent myocardium will hypertrophy and continue to maintain a pulse pressure one-half as great as the diastolic pressure. We frequently see patients with systolic pressures of 180 mm. of mercury and diastolic pressures of 110 or 120 mm. and hypertrophied hearts who get along well; in fact have probably carried increased pressures for many years. They do not consult us until the myocardium begins to weaken. Such beginning failure is frequently accompanied by a drop in the systolic pressure without change, or possibly with elevation, in the diastolic pressure and consequent narrowing of the pulse pressure, or effective part of systole. If this condition persists manifestations of congestive failure develop.

It is thus apparent that the systolic pressure is really the sum of diastolic and pulse pressure and its actual value is of less importance than the ratio of pulse pressure to diastolic pressure. The heart endeavors to maintain this ratio, and an ade-

quate circulation as long as possible. When the myocardium begins to fail the systolic pressure falls at the expense of the pulse pressure with signs of resulting circulatory failure. The hydrodynamics of the circulation just described are true in a general way only as there are many other factors which cannot be considered here; so there are exceptions to the conditions mentioned above. For example, it is possible to have a failing circulation and a normal ratio between pulse pressure and diastolic pressure.

If all this has the ring of "commenting upon the obvious" it must be charged up to a bedside reaction to innumerable articles upon hypertension, its drug and dietary treatment, the writers having chiefly in mind the systolic pressure. Except to avoid an apparent, impending cerebral hemorrhage, all treatment which is not directed toward reducing diastolic pressure should be aimed at aiding the heart to maintain the optimum pressure, even if this be greater than our concepts of what constitutes normal.

But how may we know the optimum pressure for each individual at any given time, and how can it be maintained? That is another, in fact, several, "Bedside" stories.

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Eugene S. Kilgore, San Francisco—An interesting topic for debate would be the value to mankind of the blood pressure manometer. The debate would not be very one-sided. Strong points to the credit of the apparatus will occur first to everyone—the advance of medical science by an instrument of precision capable of replacing vague tactile impressions by figures; the light thrown on the clinical cases of nephritis, eclampsia, shock, cardiovascular disease, brain injury, etc.

But the opponents of the apparatus would also have cogent arguments. They would first, in rebuttal, point out that most cases where the blood pressure reading is considered an important item in diagnosis are sufficiently clear to the careful observer without it. Small differences of pressure are usually not very important, and large abnormalities are usually perceptible to the skilled finger on the pulse,* and are usually accompanied by other distinctive clinical phenomena.

Then would be displayed certain positive disadvantages chargeable to the instrument—its injuries to science, to doctors, and to patients. Science suffers through an unwarranted assumption of accuracy in the blood pressure readings. The disturbing effects of psychic state, position of the body, nonrelaxation of the arm, prolonged cuff pressure, etc., are usually underestimated. The technique itself, especially the criteria for readings, after innumerable publications on the subject, is still poorly standardized and its critique ill understood. For diastolic readings, actually the more important, two indices are in common use, the change of sounds (fourth phase) and the disappearance of sounds; either or both may be quite indistinct, and their separation on the pressure scale, while usually small, is always variable and at times large. Most doctors use and most of the life insurance companies prescribe the auscultatory index for systolic readings—in total disregard of the facts long since established that (*a*) these readings are farther removed from true systolic pressure than those obtained by the simple palpatory method,* (*b*) that the auscultatory method has no advantage over the palpatory in minimizing the "personal factor,"* and (*c*), most important, that the "auscultatory gap" or the total absence of sounds in the upper register not infrequently leads to gross error.*

Injury to the doctor may be found in the disuse atrophy of his clinical powers, which the blood pressure apparatus in common with all other technical diagnostic aids has fostered. This would not be a very strong point in the argument, for it could be shown in rebuttal that the doctor who allows his observation and common sense to be dwarfed by these means would be a poor one under any circumstances.

But injury to the patient is a different matter. Here is the most serious arraignment against the apparatus. Figures have a peculiar fascination; witness by contrast the arduous labor of the salesman of sound bonds, and the fireside mania over the "market" in a popular listed bank stock. Popular interest in such quantities as body weight, blood-sugar level and now hemoglobin percentage (in pernicious anemia) is usually salutary. An adverse fluctuation in the figures excites no apprehension but only renewed therapeutic efforts with success practically assured. But blood pressure, we may as well admit, is still pretty much out of control; and the worst of it is that its sinister significance is often vastly exaggerated in the minds of patients. Over many years we observe patients with essentially benign hypertension whose health (health of mind, to be sure, but nevertheless the principal thing in life) is ruined by the sense of impending disaster. For them psychotherapy is only partially successful. They live in a fruitless endeavor, by regimen and treatments, to reduce blood pressure. They visit the doctor to get their readings; and one of my patients I find has bought a machine with the directions for use, and has taught his housekeeper to make the readings! And the doctor who realizes all this may, to be sure, lessen the ravages of the blood pressure ma-

* Systolic pressure can be "guessed" with considerably increased accuracy if the following technique is practiced: Place three fingers on the radial artery, preferably the left index finger proximally, the right index in the center and the right second finger distally. Use firm pressure with the distal finger to prevent passage of pulse waves upward by way of palmar arch arteries. Use the center finger for detecting pulse waves, holding it lightly over the artery; and use the proximal finger to observe the pressure necessary to prevent passage of pulse waves. But at the outset raise the center finger, and, by light pressure with the proximal and distal fingers, draw them together, puckering the patient's skin between them; then exert firm pressure with both, and move them apart far enough to admit the center finger to its position but not far enough to stretch the intervening skin. The center finger now rests on unstretched skin overlying an empty segment of artery (and here, by the way, is the proper place to judge the texture of the artery wall, and the impression thus gained is often quite different from that obtained by palpating the distended artery). Now gradually relax the pressure of the proximal finger and note the feeling of pressure when pulse waves first enter the collapsed segment.

* References: Volhard: Verhandl. d. Cong. f. in Med., 1909, xxvi, 208. Müller and Blauel: Deut. Arch. f. klin. Med., 1907, xci, 517. Kilgore: Arch. of Int. Med., December, 1915, Vol. xvi, pp. 893-954. Sewell: Am. Jr. Med. Sci., 1919, Vol. 158, p. 786.

chine, but he can hardly hope to exclude them from his practice. If he does not take the readings his patient will go elsewhere. And if the doctor declines to divulge his blood pressure readings his patient will often leave with greater apprehension than if he had been told the worst. One very intelligent man who had known of his hypertension for many years visited a doctor in a strange city for some trifling complaint. The doctor measured the blood pressure and said nothing; and the patient asked no questions, but he promptly returned home to wind up his affairs, for he had observed "a look in the doctor's eye" more foreboding than words.

I pass no judgment on the suggested outline of debate. No debate and no judgment are needed. The blood pressure machine is here and must be used, but our use of it will be better if we do not forget its limitations and its positive disadvantages.

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James F. Churchill, San Diego—The popular medical subject for lay discussion for the past decade has been "blood pressure," and it is a very difficult one for the physician to handle to the best interest of his patients. The amount of misinformation that patients manage to accumulate regarding this subject is amazing. And their curiosity is no less so. So frequently patients say to me: "Now, Doctor, please tell me just what causes blood pressure." And to such a demand every physician should have an answer. The reply will depend, of course, on the intelligence of the patient, but it should at least be one that will satisfy and if possible dispel some of the absurd notions he may have.

I am sure the medical profession is partly to blame for this state of affairs, for "blood pressure" has become almost a fetish with many physicians. The pressure should be taken in the course of an examination, but the patient should not be told the figures. I explain to the patient that the bare figures mean nothing, and that he will be happier if he does not know them. Minor variations in the readings depress or elate the patient, often without reason and with bad effect. I have had many patients come in with notebooks in which it had been their custom to jot down each date and reading. Nothing could be worse for the peace of mind of the majority of patients of this type. Their spirits go up and down with the mercury in the manometer.

Pressure readings taken on patients at a first examination are rarely correct for that individual. We are apt to overlook the fact that a physical examination by a new doctor is often an ordeal for the patient, producing an increase in heart rate and blood pressure. For this reason the reading at first examination should only be accepted as tentative. Insurance examiners should especially bear this in mind, for a grave injustice may be done a perfectly good risk unless several readings are made on different days.

A great deal can be accomplished if we try to make our patients feel at ease before the examination is begun. This is a little point worth keeping in mind during the history-taking.

Let us take the blood pressure, but let us remember that a blood pressure reading is not a diagnosis. Let us also remember that every patient we see is sick, or suspects he is, so let us be careful not to add to his troubles and worries by calling his attention to the fact that he has a "blood pressure."

Barbital Addiction.—Many conditions legitimately call for the medical use of depressants of the nervous system. The relief of pain is doubtless the most prominent illustration, though it is not the only occasion for the therapeutic administration of potent drugs of this class. Cerebral excitation, sleeplessness and certain disconcerting psychic states often require some counteracting influence in the interest of bodily welfare and avoidance of intense distress scarcely less tolerable than the pains of physical injury. Mankind has long made use of agents that would conduce to relief. Vicious habits have thereby become established when the administration was not supervised by an intelligent adviser such as the physician should be.

Alcohol and opium were formerly our principal hypnotics, but they have been superseded largely by others. In this country the force of law as well as a modified public sentiment has served to hasten the change, which is one of substitution rather than omission. The catalogue of the newer hypnotics is a formidable list of synthetic chemical compounds, some of them exhibiting striking usefulness. Meanwhile the layman has not been slow to discover the potency of the novelties and has often applied them to his desires inadvisedly. New drug addictions have thus arisen and brought fresh problems for solution to the innocent physician. When a single practitioner can report, as Work has done, a hundred cases of acute poisoning or chronic addiction with one of these drugs, the situation is evidently one that challenges serious attention.

Barbital, introduced under the trade name of veronal, has a tremendous and increasing lay popularity for self-administration. Its habit-forming propensities are sufficiently well recognized to merit the special designation of barbitalism or veronalism. The opportunity is readily created. Finding himself unable to react adequately to environmental conditions, as Work points out, the man who is either constitutionally or acutely below the standard dulls his sensorium with barbital, just as other drugs are used as a refuge from circumstance. It should be remembered, he adds, that a host of proprietary hypnotics now on the market are of the same chemical series as barbital and may induce in greater or less degree the same results. Poisoning resulting from barbital taken in conjunction with one of its congeners is more difficult of treatment and offers a poorer prognosis. According to Work, addiction to barbital does not stop with the production of moderate euphoria. Judgment, orientation as to time, and insight are probably the most severely harmed of the psychic faculties and are the last to clear up in convalescence. Cases of residual defect fall almost entirely in this class. The mentality in this condition precludes complicated criminality or conspiracy, and the appearance does not inspire confidence sufficient for the consummation of any but the crudest frauds or clumsy impositions on friends. Ethical offenses, as against decency, and minor frauds, such as issuing fundless checks and forgery of an unskilful type, are well within the possibilities. Carelessness may well result in acts of an apparently criminal complexion. The paranoid reactions are usually too fleeting to endanger anyone, but the dulled sensorium may lead to quasi-criminal complaisance with the schemes of others. These are indeed disturbing pictures for the contemplation of nations that are endeavoring with great zeal to free themselves from the more familiar types of drug addiction. The "safe" hypnotics may become menacing to the public welfare.—*Jour. A. M. A.*